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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/780,606	02/19/2004	Jae-Hee Oh	9862-000026/US	3174

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EXAMINER	
NADAV, ORI	

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 01/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/780,606	OH ET AL.	
	Examiner	Art Unit	
	Ori Nadav	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 November 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8 and 10-22* is/are pending in the application.

4a) Of the above claim(s) *3,4 and 10-22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 5-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-2 and 5-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claimed limitation of an insulating interlayer, as recited in claims 5 and 8, are unclear as to whether the insulating interlayer is one of the first or second insulating layers, what is the structural relationship between the insulating interlayer and the first or second insulating layers.

The claimed limitation of a first metal wiring having a first metal thickness, as recited in claim 1, is unclear as to the first metal thickness is in the x direction or the y direction (i.e. height) of the first metal wiring.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-2 and 5-8, insofar as in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura et al. (6,163,046) in view of Suwanai et al. (5,389,558).

Regarding claim 1, Okumura et al. teach in figures 35 and 38 and related text a semiconductor device comprising:

a cell array region 3 formed in a semiconductor substrate and including a capacitor having a lower electrode and an upper electrode, the lower electrode having a lower electrode height;

a peripheral circuit region 4 formed in the semiconductor substrate and including a first metal wiring, the first metal wiring 21B having a first metal thickness, and having a lower surface in a substantially planar orientation with a lower surface of the lower electrode 16 (the lower part can also be 28P as depicted in figure 38);

a first insulating layer 14 formed on the cell array region and the peripheral circuit region and having openings; and

a second insulating layer 20 formed on the first insulating layer, the first metal wiring 21B being arranged in the second insulating layer 20,

wherein the second insulating layer 20 includes a first sub-section (the lower part of second insulating layer 20) surrounding the first metal wiring 21B and a second sub-section (the upper part of second insulating layer 20) formed on the capacitor 19, the first metal wiring 28p (see figure 38) and the first sub-layer 14, the second sub-section including a lower section that is formed between the upper electrode 19 and the first

metal wiring 21B, and an upper section (the upper part of second insulating layer 20) that is formed over the upper electrode 19.

Okumura et al. do not categorize the second insulating layer as including a first sub-layer and a second sub-layer, wherein the second sub-layer including a lower layer and an upper layer. That is, Okumura et al. do not form the sections of the second insulating layer as separate layers.

Suwanai et al. teach in figure 1 and related text a second insulating layer 51 includes a first sub-layer and a second sub-layer, wherein the second sub-layer including a lower layer and an upper layer.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a second insulating layer which includes a first sub-layer and a second sub-layer, wherein the second sub-layer including a lower layer and an upper layer in Okumura et al.'s device in order to improve the protection to the device by using plurality of layers.

Regarding claims 2 and 5-8, Okumura et al. teach in figures 35 and 38 and related text a first conductive plug 25, 28 extending through the first insulating layer 14 to connect the lower electrode to the semiconductor substrate; and

a second conductive plug 25, 28 extending through the first insulating layer to connect the first metal wiring to the semiconductor substrate.

first gate structures (including source and drain) formed in the cell array region, the first insulating layer being formed on the first gate structures;

second gate structures (including source and drain) formed in the peripheral region, the first insulating layer being formed on the second gate structures;

a first storage node contact hole and a first bit line contact hole 12, 28 formed through the first insulating layer for exposing a first surface of the substrate in the cell array region;

first metal contact holes formed through the first insulating layer for exposing the first and second gate structures and a second surface of the substrate in the peripheral region;

conductive plugs formed in the first storage node contact hole, the first bit line contact hole and the first metal contact hole, the first metal wiring being in electrical contact with the conductive plug in the first metal contact hole;

a capacitor formed in the second insulating layer 20 in the cell array region, the capacitor being in electrical contact with the conductive plug in the first storage node contact hole;

an insulating interlayer 20 formed on the capacitor, the first metal wiring and the second insulating layer; and

a second metal wiring 32 formed on the insulating interlayer in the peripheral region, the second metal wiring being electrically connected to the first metal wiring,

wherein the peripheral region includes at least one of core circuitry peripheral circuitry and logic circuitry,

wherein the capacitor has a metal/insulator/metal structure, and

a bit line formed on the insulating interlayer and electrically connected to the conductive plug in the first bit line contact hole through a second bit line contact hole formed through the insulating interlayer, wherein the bit line and the second metal wiring are formed from a single metal layer,

wherein the insulating interlayer includes a first sub-layer formed on the first metal wiring and a second sub-layer formed on the capacitor, the first metal wiring and the first sub-layer.

Response to Arguments

Applicant argues that the claimed limitation of a first metal wiring having a first metal thickness, as recited in claim 1, is clear because this limitation is supported by paragraphs [0021], [0044] and [0049].

Paragraphs [0021], [0044] and [0049] do not explicitly define the phrase "first metal thickness". Therefore, it is still unclear as to whether the first metal thickness is in the x direction or the y direction (i.e. height) of the first metal wiring.

Applicant argues that prior art does not teach a second insulating layer includes a first sub-layer surrounding the first metal wiring and a second sub-layer formed on the capacitor, the first metal wiring and the first sub-layer, the second sub-layer including a lower layer that is formed between the upper electrode and the first metal wiring, and an upper layer that is formed over the upper electrode.

The specification recites forming three separate layers, 120, 124a and 124b. The second insulating layer 120 is first formed to surround the first metal wiring 122 and then insulating layers 124a and 124b are formed, wherein insulating layer 124b is formed on the capacitor, the first metal wiring and the first sub-layer, and wherein insulating layer 124a is formed between the upper electrode and the first metal wiring. Finally, insulating layer 124b is formed over the upper electrode. However, in claim 1, applicant arbitrarily categorizes layers 120, 124a and 124b as one layer (second insulating layer), which can be divided into three separate sections (layers). Applying the same analogy to prior art, Okumura et al. teach one layer (second insulating layer 20) which can arbitrarily be divided into three sections (layers). Suwanai et al. further teach one layer (a second insulating layer 51) includes a first sub-layer and a second sub-layer, wherein the second sub-layer including a lower layer and an upper layer.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ori Nadav whose telephone number is 571-272-1660. The examiner can normally be reached between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

O.N.
1/19/06

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PRIMARY EXAMINER
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